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Patent Lamps.

To the entire people of this and every enlightened nation, the subject of light is an essential one, scarcely surpassed in importance by what we eat, drink, and wear. The glorious sun shines on city and country alike, and its daily benefits are mutually enjoyed in the abodes of the rich and poor; but at night the methods of furnishing artificial light for our homes, churches, places of business and amusement, have been varied and imperfect, as well as dangerous and inconvenient. As the result of many discoveries and continued improvements of American inventors, candles, whale oil, burning fluid, and coal oil have, after continued unsuccessful experiments, succeeded and superseded one another, until now refined petroleum, familiarly known—by the trade-mark of one of our oldest refiners—as kerosene, has become the "world's popular illuminator," and nothing is so universally used throughout all civilized countries as this.

FIG. 1.

Even in the large cities, where gas has been introduced most extensively, lamps are considerably used by the common people; and the adoption of kerosene fixtures in public offices and private residences, whenever a movable light is especially required, is far more general than would be supposed.

The long felt desideratum has been good fixtures, properly adapted for the safe and satisfactory burning of kerosene, in order to enjoy its full benefits. To supply this deficiency and overcome the many objections to lamps heretofore in use, has been the aim of the inventor of Ives' patent lamps, the object having been to produce a lamp which should be, among other lamps, what a chronometer is among other time-keepers.

Fig. 1 shows a description of lamp that has become exceedingly popular. We refer to spring bracket lamps that are so well adapted for kitchens, chambers, and small rooms throughout the house, in place of the small, unsafe hand lamps so commonly used, many with no chimney to keep the flame in safety, or prevent smoking. The arm that sustains the shade and chimney is stationary, being screwed securely to the case or spring-box. The fount is fastened in the ring by the screw in front, and sustained in its proper position for burning by means of a steel spring within the box, which also returns it to its place after being lowered for lighting, filling, etc. The fillers made by the manufacturers are made with long, slender, bent spouts, expressly for these lamps, and are a great convenience in draining the oil from the barrel and filling the lamp neatly.

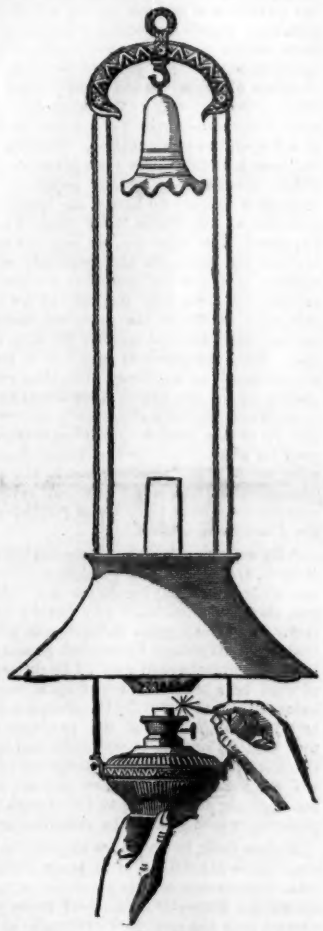

FIG. 2.

Fig. 2 shows a reflector standing lamp, which operates on the same general principle as the hall lamp, the shade and chimney balancing the fount and oil. The facility with which this description of hanging lamp can be lighted is seen in the engraving, which shows the lamp open, ready for lighting, filling, or trimming; this is easily done while the fount and burner are lowered and separated from the shade and chimney, which at the same time move upward together. They may be separated a greater or less distance, as desired, raising the chimney up to the smoke-bell, and bringing the lamp down where it may be lighted and cleaned conveniently, or the fount can be removed.

FIG. 3.

JULIUS IVES & CO.'S PATENT LAMPS.

Fig. 3 represents a very neat attachment for chandeliers, bracket and table lamps. The shade and chimney being combined with the cone of the burner, are opened together on a hinge whenever the wick is to be reached, and remain open while the lamp is being trimmed, cleaned, filled, or lighted, and are then as readily closed for burning. In filling the common lamp, the globe, chimney, and burner are all necessarily removed; in the lamps which we are describing the attachment is opened and filled without soiling the hands, through the feeder-burners, which never need be unscrewed from the lamp.

These improved fixtures commend themselves by their intrinsic merits. They are economical, because they give the full benefit of all the light the oil can furnish; require no waste of time in their management, and obviate the unnecessary breakage of glass-ware; safe—as with good oil and proper care explosions are impossible, and the lamps being stationary, they can

not be carried, overturned, or dropped; convenient—as they can be lighted as quickly as gas; filled and trimmed without removing the shade, globe, or chimney, or unscrewing the burner; and are kept in order with less trouble, time, and expense, than any other lamp in use; brilliant—as with the improved enameled reflector shade or patent corrugated reflector, an economical division of the light is accomplished, whereby nearly all its rays are concentrated and increased in the lower part of the room, and very little light wasted above.

It will be seen that the general features of these lamps are not peculiar, so far as respects their burning, yet the improved principles upon which they are constructed are claimed by the inventor as new, original, and important, on account of the undoubted advantages over the old methods for using petroleum, and for enjoying to the fullest extent its illuminating qualities. The extensive show and sales rooms of Messrs. Julius Ives & Co., are at 49 Maiden Lane, New York, where lamps of all descriptions can be seen, examined and admired.

New Apparatus for Gauging Petroleum.

A novel and admirable invention is now on exhibition on board a lighter at Hunter's Point, L. I., by a company who have thereby greatly facilitated the measurement of petroleum oil, as it is shipped in bulk. The company is principally engaged in packing and refining petroleum at the above place, and their establishment is said to be the largest in the world. It is known that this useful oil is now sent to foreign ports in tin cans, which are much preferred to ordinary wooden casks for that purpose. The company manufacture their own cans, holding five gallons each, and have facilities for packing and shipping 80,000 gallons (soon to be increased to 100,000 gallons) per day. They have two large manufactories in which to make the patent cans; two warehouses, with about 1,200 feet of wharfage, to accomodate vessels in loading and unloading cargoes; two steam engines and pumps; tankage for about 500,000 gallons of oil; storage in barrels for as much more; a steamboat, ten lighters, horses, trucks, etc. A large number of these five-gallon cans are filled simultaneously and quickly by a new contrivance, and after the mouth of each has been sealed, they are placed in wooden cases—two in each case. Heretofore the oil used in this establishment was conveyed from the refineries in casks, and was necessarily gauged by the revenue inspectors at the refinery, and again at the packing house. To be able to dispense with the use of barrels in transportation, and to simplify the work of measuring, has long been a desideratum to all connected with this business. An apparatus for gauging in bulk, placed on board a lighter, and attached to a tank in the hold, has been invented by Mr. G. W. Devoe.

The tank has a capacity of 600 barrels, or 2,400 gallons, and is constructed like those used for conveying the crude article. In a house on deck, near the bow of the vessel, are located the meters. They consist of two cylinders of boiler iron, resting on a frame of wood, each capable of holding exactly 200 gallons. Two sets of valves, moved by levers, admit the oil from 3-inch iron pipes entering the meters at the top, or discharge it through a 4-inch pipe issuing from the bottom. The levers are moved by hand. Two perpendicular glass tubes, each about one-half of an inch in diameter, and three or four feet long, connecting respectively with the throats of the two meters and measured by a scale corresponding to the capacity of the meters in gallons, readily indicate their contents while being filled or discharged. There is a small glass tube leading from the tank in the hold, which answers the double purpose of an escape-way for gas and a tell-tale when the former is full. Through the top of each meter is passed a piston or plunger eight or ten inches in diameter, having a spiral action, whose office is to reduce the capacity of the vessel in proportion as the temperature increases the density of the oil. The object of using a double meter is to facilitate the taking in and discharging of cargo, for, while the petroleum is running into the one, it may be falling from the other into the tank. By the aid of this apparatus, the labor of inspectors will be reduced in respect to the gauging refined petroleum in transit; for, supposing it to be accurate, the inspector will only need to stand before the dial-plates of the meters and note the movements of the fingers thereon. —*Druggists Circular.*

Cincinnati Gas Question.

Shall the City of Cincinnati Buy the Gas Works? And make its own Gas?

[From the Cincinnati Railroad Record.]

This proposition comes up in the following shape. In December, 1866, (recently) a Committee on the part of the City Council addressed a memorial to the Legislature, saying:

"Our City Council are practically debarred from purchasing the Gas Works by the restrictions placed upon the issuing of City Bonds, under the act of the General Assembly of April 6, 1866. The Council ask to have those restrictions removed, to enable it to proceed at once to the purchase of the Works. We hope in this, so reasonable request, to have your hearty co-operation."

The sum asked for is *three millions of dollars*, a sum enormous as it is, which (as we shall show) must be increased to five millions (!) before the city will have got fairly under way as a manufacturer of gas. This modest proposition is said to be a "reasonable request," because, at the October election, a vote was taken on the purchase of the gas works, which resulted in round numbers, 15,000 *for*, and 6,000 *against*. There are two facts, which show this vote to be wholly delusive and unimportant. First, it is perfectly notorious, that the October election turned wholly upon politics, and no other question was really considered; secondly, that only about two-thirds of the voters at the election voted at all upon the gas question. To this it may be added that not half the whole vote given at the election were either *consumers* of gas, or *payers of tax*; and ought persons who have no house, no business interest in the question at all, decide it for those who pay the whole expense? For example, we pay the taxes for gas, but we use no gas. On the principle of that vote, any amount of taxes for gas may be levied upon the tax payers, by those who pay no tax for it? We mention this only as one of the practical incidents in the proposed speculation of making the city a manufacturer of gas. But, independent of all such considerations, we are opposed, as we have more than once stated, to imposing upon the city of Cincinnati an enormous debt, to do what common experience proves any individual can do better than a City Corporation. This we propose to show; but, in the mean time, we must clear away some of the rubbish, put in the statements of the Council Committee, on the authority of a volunteer committee, whose report was published last autumn in the *Cincinnati Gazette*.

"By referring to the accompanying report of Messrs. Burton, Gates and Von Phul, it will be seen, that whilst our citizens are paying $3 25 per 1,000 cubic feet for gas, those of Pittsburgh pay but $1 60 per 1,000 cubic feet. This very great difference in price does not arise from any advantage Pittsburgh possesses over our city in the manufacture of gas. The difference in the price of coal between the two cities is more than counterbalanced in our favor by the constant demand and higher rates obtained from the products arising from the manufacture of gas, to wit, coke and coal tar. Add to this the much greater consumption in our city, and it will readily be seen that we possess not merely *equal*, but *superior* advantages to Pittsburgh in the lowness of price for which gas can be manufactured."

Prima facie, it would be impossible to make a statement more absurd. Put in plain words, it amounts to this. Bituminous coal is produced at the doors of Pittsburgh, for something like four cents per bushel. Cincinnati uses the coal of Pittsburgh, at the lowest price of 12½ cents per bushel. *Therefore*, Cincinnati can make gas cheaper than Pittsburgh! Absurd as this is, and palpably false, as the proposition is, we are in courtesy bound to suppose, that the committee of the Council had some reason for such a conclusion. It seems to be all contained in the sale of "coke and coal tar." The committee gives no fact or reason for supposing there is a greater demand or higher rates for these articles in Cincinnati. But if there were, what does it amount to? The committee say that the gas company at Pittsburgh get 1½ bushels of coke for a bushel of coal, and that the price of coke is 5 cents per bushel, which gives 7½ cents for the coke. In Cincinnati, the gas company (as they do in Philadelphia) get but 1 1-5 bushels of coke, and the general price has been 8 cents and now 6, which gives 9.60 cents for the coke. Then the Cincinnati Co. gets nominally (on the hypothesis they sell it all) a gain of 2.10 cents per bushel over the Pittsburgh Co. Now, the additional price of coal is 8 cents per bushel, from which subtracting the gain as coke (2.10) leaves a loss to the Cincinnati company of nearly 6 cents per bushel on coal! The tar material is of little importance in either place. This is the practical mode in which the committee have come to the absurd conclusion, that we can manufacture gas cheaper than they can in Pittsburgh! As a sample of practical logic, we commend it to the careful reading of the intelligent citizens of Cincinnati.

But, the committee have incidentally let out two or three facts, which completely upset their other statements. They say that the city of Pittsburgh *gave* the company $170,000 when they began. As the gas-works there are not more than one-third of those of Cincinnati this is equivalent to gift by Cincinnati, of half a million of dollars to the gas company. Suppose Cincinnati tries such an experiment on the gas company, and see if the city wont save more than by buying the works! The truth, upon that point, we believe to be this: that the city of Pittsburgh having a presentiment of what the city would accomplish as a manufacturer of gas, *voluntarily relinquished* its works to a gas company, giving *them nearly half the stock*; and the dividends the company have been dividing are dividends on only half the *original stock*.

Again, the volunteer committee make a stupendous statement, that in eight years or so, they can pay off two and a half millions of dollars, and the interest on it! Men acquainted with city affairs know they will do no such thing; but will start with a fair prospect, according to all previous precedent (take any example you choose in the city history) of increasing the debt largely. But at what rate do they propose to do this? Is gas to be cheapened any? They do not even pretend so. The rate at which the calculation is based (stated by themselves) is $2 50 per thousand, exclusive of taxes. That is, the committee gravely and openly proposes that the city of Cincinnati shall *advance three millions of dollars, the present loan asked for, and then make gas at precisely the same rate the gas company propose to make it.* Where, in this grand scheme, is the poor consumer? where is the tax payer, already ground under a taxation of seventeen mills on a dollar, only 3½ of which are for all the purposes of the State government? The consumer is left just where he was, and the tax payer may groan on without a remedy.

We say that the rate for gas proposed in this calculation is just what the company propose. We are informed (and believe the Records of the committee show it) that a committee of the council after looking through this subject, informed the company that if it would agree to take $2 50 per thousand, for a period of five years, they would recommend that to the City Council. It was accepted and recommended, and the Council rejected it. Who, then, has made gas dear to the consumers? This subject has been agitated for two or three years, and nothing has hindered the consumers from having a reduction of price during that time but the fact that the Council would come to no terms whatever, and then the company could not anticipate the future, by making economical arrangements. So much for the proposition to make a city speculation, on the data of the Pittsburgh gas-works. The committee have managed to contradict themselves so effectually, that no further notice of their memorial is necessary. But we may add some other facts, of which the Council and Legislature are perfectly cognizant, and which may be said to declare the opinion of the best business men of Cincinnati, on what is a fair price for gas. It will be recollected, that about two years since, a large number of monied business men of Cincinnati proposed to take the gas-works from the city of Cincinnati, on certain terms. What were they? Why, that the city should furnish the whole capital, that the time should be thirty years, and that they should pay $2 25 per thousand for both public lamps and private consumers. A close examination, comparing item by item, proved that this offer was, on a general average, a very little below the gas company, but that the gas company asked for only *ten years*. In that time the company would have to reduce its terms to specie standards, while these gentlemen would go on for twenty years more. The thing was too barefaced for the Council to accept, while at the same time they accepted no offer from the company, by which the price might be reduced to consumers. But the reader will mark, that those intelligent business men *never made that proposition again, nor has that, or any similar one, been heard of.* This is equivalent to a verdict, by intelligent, calculating monied men, that no better proposition could safely be offered.

We now come to the simple question, whether the city ought to own the gas-works? Whether a city can hope to conduct such a business safely, or profitably? It happens that this very Pittsburgh gave up its works to a company. But a far better example, and much more analogous to that of Cincinnati, is Philadelphia. The advocates of city control over gas-works have been fond of citing the example of Philadelphia, which, they said, managed its gas-works finely, and made them profitable. Well, to the Philadelphia works we will turn for instruction. The city of Philadelphia owns and manages its gas-works. What is the result? After going on several years, and apparently making profits, the city is startled to find that the gas is deteriorated, the prices higher, employees corrupt, the works used for political purposes, and the city is without dividends. This is precisely what the observers of city management may expect. But the good people of Philadelphia seem to have waked up, as those of Cincinnati may hereafter, to no small astonishment. A committee of the Council is appointed to investigate the affairs of the gas-works, and we have before us the substance of their

report. Let us look at some of the most important facts, for the edification of those who think cities good managers of business. The following data, taken from the report of investigating committee, will explain themselves.

LEAKAGE AND WASTAGE.

In the annual report for 1865, page 53, the loss which is put down to this cause alone, amounts to the enormous quantity of 112,490,549 cubic feet of gas. For the preceding year of 1864, it is placed at 83,390,575 cubic feet. The average for the five years of 1859, 1860, 1861, 1862, and 1863, will be found by the table referred to, to be 61,475,206 cubic feet, so that the loss by leakage, as it is called, exceeded in 1864, the average by 21,915,369 cubic feet; and in 1865, by 51,015,343 cubic feet.

The term leakage is made to cover every foot of gas after it is measured into the holder, that is not accounted for at the end of the year by the cash received into the treasury, and the suspended debt. This latter item is exceedingly small.

The wastes from mismanagements at fires, or imperfect retorts, is not included in this. It appears that this waste was going on at a rapid rate of increase—and where would it stop? The committee state explicitly, that the great increase of waste is due to the *mismanagement of the works themselves;* by allowing a greater heat than was necessary to develop the harmonious principle. Let us now see how much this waste costs the city. The committee say:

Estimating the loss on 51,000,000 cubic feet, being the excess above the average of preceding years, at $3 per thousand feet, it would show a total on this item of $153,000, less 5 per cent., for prompt payment. This is the loss upon gas stored alone outside of that which occurs in the process of making it from various causes, and which may be increased or diminished, depending solely upon the care and skill exhibited in its manufacture.

One hundred and fifty thousand dollars loss to the city of Philadelphia, over and above the average loss from wastage, by its manufacture of gas, in a single year. This may serve as an illustration of what Cincinnati may expect. The "solution," says the committee, "is *defective gas, from unskilled labor, and imperfect heat.* What was the cause of this? The skilled men were turned out for *political causes*, and new men to learn their new trade.

CORRUPTION.

The committee states explicitly in some cases. We cite the following simply to show that there is proof of this:

It was proven before the committee, that in two or three cases, the foreman of one of the gangs at the retort house at Point Breeze, had returned and permitted men to draw pay for the whole month, when some of them had been absent for days, and one of them for weeks. The excess of pay in such cases was handed by the men to the foreman.

Other examples were cited, but this is a specimen.

CITY SUPPLYING ITS OWN LAMPS.

So too is the fact that the deficiency or loss on public lighting, is based upon the presumption that the gas supplied was as to quality and quantity what the city was entitled to receive. Yet it is a notorious fact, within the knowledge of every observant citizen, that in neither respect, nor as to time of late years, has the city been supplied as she ought to have been, with occasional exceptions.

This is said of a city which makes its own gas, and carries it on, by trustees, as proposed by the Bill before the Legislature.

CAUSE OF THE LOSSES.

The committee say:

To sum up the whole, the failure in the management of the gas-works may be largely attributed to the introduction of politics in the appointment of the Trustees and their employees. Commenced years back, this evil has grown in force and intensity. Certain it is that corruption once begun, goes on increasing, and the last year will always be the worst. Each set of politicians, according to the power they possessed, used the works for their own ends. While it is not intended to screen any of the trustees, past or present, from the odium they deserve for so prostituting a trust into which they should never have permitted politics to enter, the facts show that this year has been the most disastrous one in the history of the works, the gross profits for it being only $121,469 95.

Thus we find that the income of the Philadelphia gas-works is fast melting away under the city administration.

RESULT OF THE WHOLE MATTER.

The committee give this summary of what has happened to the Philadelphia Gas Works, carried on by the city.

It cannot be denied that there has been gross mismanagement, even if the charge of corruption be doubted. The profits have disappeared, the expenditures have largely increased, the citizens pay heavier, and receive less light, while the works which were regarded in the prospective as a source of sure profit, are now a burthen to the city.

We need no more citations from the report of the Philadelphia committee to show—that in the best city of the country—on which to try the experiment, the conduct of the gas works by the city, has utterly failed. The force of this experiment cannot be broken by the advocates of purchasing the gas works by the city, for this very experiment in Philadelphia has been held up to show how well and profitably a city can carry on such works.

We have directed our inquiry solely to the question, whether a city government can, or ought, to carry on gas works; but there is another question, certainly of some importance to the citizens. This is the debt incurred. How much is to be paid to buy and carry on the gas works, independent of current expense. Unfortunately the committee of the City Council give no information on this head. They ask for three millions of dollars, but forward no proof of the real sum required. In fact, they cannot, because the contract of the company with the city requires that of the five appraisers, two may be appointed by the company, and a third to be a disinterested party. It is evident that the city cannot fix, nor even limit what price it will pay. Another fact is evident, that if the city now buys the gas works, it must pay *much more than they really cost*, for every part of the works would require to build them double the money required six years ago. It is impossible for any board of appraisers not to take notice of this fact. Hence the city must pay more for the works than they would in past time, and probably much more than they would pay on the resumption of specie payments.

There is another matter the committee have failed to notice. What have they allowed for the annual addition to the capital, by extensions absolutely necessary. It is true of gas works as of water works, that the surplus funds are imperatively required for extensions. The gas works, by whomsoever conducted, must extend its pipes about four miles each year. Has the Council calculated how much this new annual extension will require of capital or receipts? All these points of great practical importance are left out of this hasty and crude scheme to make the city of Cincinnati a manufacturer of gas, by the advance of millions of money. Ought not the Legislature to hesitate in aiding this extravagant and unnecessary experiment to discover whether a City Council can make and sell gas at a cheaper rate than a private company whose special duty it is, and whose experience has taught them the best modes? We trust the *facts* presented in this article may at least induce inquiry on the part of intelligent men, whether gas may not be procured of the company upon fair terms? And, whether the city can do better by manufacturing gas for itself?

A Wonder of Nature.

The California correspondent of the Milwaukee *Sentinel* gives the following account of a wonderful discovery which has recently been made in that State: "A vein of very curious rock has recently been discovered in El Dorado county, which as yet has failed to elicit from the scientifically inclined any satisfactory explanation. Several large slabs have been taken out and are now on exhibition in this city. Its peculiarity is that it represents landscape drawing wrought by the hand of nature thousands of years, perhaps, before the advent of man upon this mundane sphere. Mountain scenery is here portrayed on ineffaceable tablets by a peerless drawing master, representing, in variagated colors, bold and rugged peaks rising one above another, and descending in long rolling ridges of hilly country. Barren rocks, trees, and manzanita brush in profusion give variety to the pictures, but nowhere is to be found that essential requisite to a complete scenic picture—a mountain stream. And here it would seem that even so matchless an artist as nature, has actually blundered. Another singularity of this rock is that the pictures extend through the entire vein, so that, cut in any direction, it cannot be destroyed. The coloring is of a dull, heavy character, consisting mainly of grades of red, yellow and black—seen at a little distance they resemble merely rude outline pencil drawing. No geological savan has favored us with an opinion as to the cause and manner of their formation. The action of water and reflection in some as yet undefined way is the most plausible hypothesis advanced. It has given rise to a 'Photographic Landscape Rock Company,' who design shipping to the Atlantic States and Europe samples for exhibition. There is certainly no deception about it, and it may justly be classed as the eighth wonder of the world."

A New Gas Meter.

While the collection of water in gas meters of the dry kind is a common cause of annoyance and complaint, not only producing flickering of the gas, but often putting it out by stoppage of the flow, and interfering generally with the proper working of the meter, there has heretofore been no provision for drawing off water from the body of the meter otherwise than by disconnecting the meter from its pipe attachments, and inverting it and shaking it so as to run off the water through the usual outlet pipe of the meter. This is a tedious and inconvenient arrangement, and the screw plugs or caps heretofore provided on the inlet and outlet pipes have only served to draw off the water collecting in said pipes, and in no way to relieve the measuring or working chambers of the meter, that in course of time become so choked with water as materially to interfere with the working of the bellows-like diaphragms, and altogether stopping the action of the meter. The extension of the inlet and outlet pipes down and outside of the meter, to form reservoirs for collection of the water, is also an objectionable feature; and, in this connection, more especially so, providing the inlet pipe with a screw plug cap covering a water-escape, as such outlet affords a ready means for establishing a connecting pipe to draw off gas that is thus consumed without passing through the meter. This invention obviates these defects, and by it a ready means is provided for drawing off water that may collect by sweating or otherwise in the meter, including the measuring or working chambers, or bellows portion of the apparatus, said invention consisting in a combination with the measuring or working chambers, of separate water-escapes or outlets, in communication with a lower water-receiving chamber, and under the control of a valve or valves capable of operation from the exterior, in such manner as that while gas is prevented passing from one working chamber to another to interfere with the working of the meter, the water may be run off or discharged from each of them, and the body of the meter generally, including, say indirectly, the inlet and outlet pipes, be emptied of water without taking down or disturbing the meter, and still the working of the meter not be materially interfered with, or without, it may be, even shutting off the gas. The invention further embraces a peculiar construction of devices for accomplishing these ends, including a valvular device common to all or most of the water-escapes, and hollow discharge screw or plug that as it is worked in or out serves, through a perforation made in its periphery, to establish communication with the interior or exterior of the meter, accordingly as it is required to close the water-escapes to the several chambers, or to establish a free vent for the water to run off from them and the meter generally. The invention also includes a peculiar elastic construction of the valvular cover or device to the water-escapes, whereby it is made more or less automatic in closing and secure when closed. James W. Mahlon, of New York City, is the patentee.—*Am. Artisan.*

Bronze Aluminium.

This is a combination of metals, aluminium forming the base, which has recently been pressed into the service of art and manufacture. In appearance it resembles gold so closely that, but for the notable difference of weight, it might easily pass for the more precious metal. It is, however, very light, and this constitutes one of its advantage. It is also hard, and its durability is said to be great. It is claimed for it that it is better adapted to the manufacture of table utensils and implements than other metals used for such purposes, other than gold and silver. No other metal is found to offer so great a resistance to the action of the grease and vegetable acid contained in articles of food, as the bronze aluminium, and prolonged contact with corroding vegetable acids produces no other effect upon it than a slight tarnish, which can be easily removed by friction.

At the Paris Exposition of last year a large quantity of goldsmiths' ware, table services, chandelabra and jewelry of all kinds, in the metal, was exhibited, and there obtained a gold medal. A firm in this city have just opened a store for the sale of this kind of articles, and though the bulk of the stock has not yet been received, they have enough on hand to afford a fair idea of the nature and quality of the material. It appears to work extremely well, the spoons, forks, cruet stands, salt cellars, dish covers, etc., which are formed of it, are extremely elegant and agreeable to the eye. As it is of the same color all through, of course it is not open to the objection so often raised against plate ware, that it sooner or later wears away, and with moderate care it is said to last fully as long as solid silver. It is much cheaper than the latter metal, and its showy appearance will probably recommend it to all whose social ambition exceeds their means.—*San Francisco Times.*

On Naphtha and Illuminating Oil from Heavy California Tar.

And on the Probable Origin of Petroleum.

By Prof. B. Silliman.

Having lately had an opportunity to examine a specimen of "surface oil," so-called, from Santa Barbara county, in California, I present the following experimental results in the hope that they may not be without interest, as an addition to our knowledge of one extreme of that class of hydrocarbons, which occur in nature in the fluid form, and of every density, from those which are but little lighter than water, down to the lightest naphtha found in a natural state.*

It is proper to state that the chemical examination of this sample had chiefly a technical object, to prove whether or not illuminating oil of good quality could be obtained from the distillation of so dense a body. The experiments were conducted on quantities of from five to ten gallons each. The crude oil was very dark, almost black, transmitting yellow brown light in thin films. At ordinary temperature (60° F.) it is a thick viscid liquid resembling coal tar, but with only a very slight odor.

Its density at 60° F. is 0·980, or 13¼° Baumé. It retains, mechanically entangled, a considerable quantity of water, which is neutral in its reaction. The odor of sulphydric acid, which is very decided in this product, as I have noted in its locality, had entirely disappeared in the specimen under consideration.

The tar froths at the commencement of distillation, from the escape of watery vapor. It yields by a primary distillation no product having a less density than 0·844 or 37° B. at 52° F.

Distillation to dryness produced in two trials an average result as follows:

Oil having a density of 0·890 to 0·900	69·82
Coke, water and loss	30·18
	100·00

In one of these trials the product was divided as follows:

Oil of density 29° B. at 55° (885 sp. gr.).. ..	50·
Oil of density 24·75 B. at 58° (908 sp. gr.) ..	17·5
Coke, water, loss, &c.	32·5
	100·0

The coke is very large in quantity, strong, and is a good fuel, resembling gas house coke. The odor of ammonia is given off towards the close of the distillation. It is well known to distillers of petroleum that by the process called "cracking," heavy oils unfit for illumination are broken up into bodies of less density, from light naphtha to the heavier illuminating and lubricating oils. This process is simply the application of a carefully regulated heat producing a slow distillation. By this treatment the molecule apparently rearrange themselves into groups of different density, which by a subsequent distillation are divided into fractions (or "heaps," as Mr. Warren calls them) of tolerably constant boiling points.

The first distillate, having a density of about ·890 at 6° F., treated in this manner, yielded a product having a density of about ·885 at 60°, or only 1° Baumé lower than before distillation. After treatment with sulphuric acid and soda and redistilling from soda, it had a density of ·880 at 60° F. Upon distilling, 100 measures of this last distillate yielded:

Light oil having a density of about ·835 at 60° F.	21·58
Heavy oil having a density of about ·880 at 66° F	37·41
Heavy oil having a density of about ·916 at 64° F.	34·53
Coke, &c.	6·48
	100·06

In another experiment undertaken with a view to "cracking," etc., treating and re-distilling with soda, the products were as follows, stated in percentages of the whole quantity operated upon, the several steps being as before:

Naphtha,† sp. gr. about ·760 at 60° F.	11·33
Oil,‡ sp. gr. about ·836 at 60 F..	60·22
Oil, sp. gr. about ·893 at 60° F..	12·67
Oil, sp. gr. about ·921 at 60° F...	3·66
Loss	6.22

The illuminating oil from both these experiments after treatment with sulphuric acid and soda in the usual manner, acquired an agreeable odor, a light straw-yellow color, and burned as well in a lamp as good commercial oil.

With a view to test the effect of heat aided by pressure in breaking up the heavy hydrocarbon—a method of treating heavy hydrocarbon oils patented in 1866 by James Young, of Glasgow—a portion of the first distillate from the crude oil was subjected during distillation to a pressure of 10 to 15 lbs. to the square inch, in an apparatus adapted to the purpose, the distillate thus obtained being about the same density as in the first-named experiment, ·890 at 60° F.

From this distillate were obtained, after the ordinary treatment with sulphuric acid and soda, the following products:

Light oil, sp. gr. ·825 at 60° F. ..	19·2 per cent.
Heavy oil, sp. gr. ·885 at 60° F...	25·86 "
Heavy oil, sp. gr. ·918 at 60° F...	38·14 "
Coke, loss, &c.	16·80 "
	100·00

The illuminating oil from the last experiment flashed at 80° F., and lighted on the surface at 85° F., showing the presence of naphtha or some very light body, the quantity of which cannot be very considerable. The light oil could, with care, be taken off in practice without materially diminishing the yield of illuminating oil. It would be rash to conclude that there may not be an important economical advantage in employing in the large way. Mr. Young's method of treatment, under pressure, over that of "cracking" by a regulated heat alone. It is highly probable that there would be found an important saving of time, as under a regulated pressure, and a corresponding increase of temperature, the transformation of the heavy oils into a mixture of less density will occur more speedily. The experiments herein mentioned gave nearly the same result, whether pressure was used or not; a certain loss, all falling upon the lighter portions, was found to result from leakage of the apparatus under pressure, which in the larger way of operating commercially could be avoided.

No paraffine could be detected by refrigerating the heavy oils obtained in these distillations in a mixture of salt and ice. It is, no doubt, the absence of this body from the series of products obtained from the California oils generally, that accounts for the illuminating oil burning well at a density considerable below the commercial standard obtained from Pennsylvania petroleum —a difference enhanced also by the absence of any considerable quantity of light naphtha. The lubricating oils of this series, likewise free from paraffine, retain on this account their fluidity at low temperatures.

The light oils obtained in this series of experiments correspond respectively to 12·96, 14·56, and 18·96 per cent. of the crude oil The total commercial products are about 60 per cent. of the crude body, which likewise yields sufficient to supply the fuel required in the distillations.

In the large way of returning the lightest oils to the heavier portions in the successive distillations, and employing Mr. Young's method by pressure, it is probable the product of light or illuminating oils may be raised in these very heavy natural products to 30 per cent., and for those of less density the proportion will be correspondingly greater.

It is evident from these experiments that heavy hydrocarbon oils containing no naphtha are convertible into oils of the naphtha series under the action of heat by molecular transformations, the excess of carbon being left behind as coke; each successive distillation eliminating a new, but always diminished portion of carbon. It may, therefore, be confidently affirmed, that even the heaviest of the California hydrocarbons belong to, and are derivations from, the petroleum series. The transformation of light oils into denser products ending with tar, like that which is the subject of this research, results not, as has been assumed by some, from the addition of oxygen producing an oxidized body, but on the contrary, by the removal of successive atoms of hydrogen in the form of water, thus leaving the carbon in excess, that excess being left behind in the form of coke when the crude product is distilled.

* I am indebted to A. J. Corning, formerly assistant to Mr. Warren, for conducting this research under my direction; and to Messrs. Downer and Merrill, of the kerosene works in South Boston, I am under many obligations for the permission to employ their operative laboratory in conducting this research. For the crude material operated on I am indebted to the Californian Petroleum Company, from whose estate it was derived.

† This naphtha caught fire from a match at the atmospheric temperature of 56° F.

‡ This oil flashed at 113° F., and ignited at 124° F.

—The *London Engineering* claims that Richard Trevithick was *the real inventor of the locomotive*, because, as it alleges, "he was the first to prove the sufficiency of the adhesion of the wheels to the rails for all purposes of traction on lines of ordinary gradient; the first to make the return-flue boiler, the first to use the steam-jet in the chimney, and the first to couple all the wheels of the engine." Trevithick died thirty years ago, but his widow, who became almost a centenarian, expired only a few weeks ago, and she has lived to see the early experiments of her husband expand from humble beginnings, until the use of the locomotive became co-extensive with civilization, and its utility in promoting commercial and individual intercourse one of the greatest benefits ever conferred upon mankind by inventive genius.

On the Mode of Working Retorts.

[From Hughes Treatise on Gas Works.]

The magnitude of the works must always decide the mode of operation. In large establishments where double retorts are used, being open at both ends, a double set of men is required to work them so as to be enabled to charge the two ends simultaneously. The economy of this over the old method of setting the retorts back to back in different ovens, is very considerable.

Where double retorts are used, each end is worked with at least three stokers, and an extra man for preparing the lids of the mouth-pieces. Others are required for extinguishing the coke, wheeling the coal into the retort-house, clinkering furnaces, and attending to fires. Three stokers, assisted by a man to extinguish the coke, will perform all the work of taking off the lids, raking out the coke, extinguishing and wheeling it away from a bench of seven retorts, in 12 or 13 minutes; they will then put the proper charge for each retort in the scoop, deliver its contents, and be ready for charging another bench in a further space of seven minutes, while a fourth workman will in the meantime have put on the lids, so that the whole work of discharging and charging the seven retorts will occupy barely twenty minutes.

This extreme dexterity is of course only acquired by long practice, and it must be admitted the labor is very severe; but this is moderated by the time the men have for repose between the charges. The first process, in discharging or drawing, is for one or two of the men to relieve the screws of the mouth-pieces of the retorts about to be discharged, by giving three or four rapid turns; another man instantly gives a knock to each of the cross bars to disengage them from the ears of the lid, and at the same time strikes the lid a blow with a piece of iron or hammer, in order to break the luting, and a light is immediately applied to prevent explosion, which would be likely to crack the retort if of clay. For want of this precaution, many lamentable accidents have happened through the gas exploding when combined with atmospheric air. The men then lift off the cross bar and screw of each retort, placing them on the ground, and then each seizes hold of a lid in both hands, lifting by the projecting ears, and placing it aside to cool, ready for luting for another charge.

Three of the stokers then take up their iron rakes, which are simply rods of ¾-inch iron, about 12 feet in length, having a handle at one end; the other end being turned at right angles is flat, about 6 inches long, 2 inches wide, and ¼ inch thick. These are inserted in the retort, and the red hot coke drawn to the mouth, whence it drops into the coke vault, where there is a man ready to extinguish by throwing water on it; or when there is no vault the coke drops into iron barrows placed ready to receive it, and wheeled rapidly away when the charge is withdrawn. If the coke were not immediately extinguished it would smolder, and the surface become covered with earthy ash, and detract from its appearance and value.

Formerly in charging retorts, the operation being comparatively very protracted, there was a considerable loss of gas, in addition to the time and extra fatigue to the men. In order to remedy these inconveniences, a method has been contrived for depositing the whole charge in the retort at once; for this purpose an iron scoop is used, this being a semi-cylinder of sheet iron from eight to ten feet long and ten or twelve inches diameter, with a cross handle at the end to assist in lifting and turning it round to empty the coals in the retort.

The charge of coal is placed in the scoop while it rests on the ground, having a bent rod underneath for the purpose of lifting it; one man takes hold of the cross handle, and two others lift the other end by the bent rod and introduce it into the mouth of the retort. The scoop with its contents is then pushed forward to the further end, turned completely over, and immediately withdrawn, leaving the coal in the retort, which is raked into a layer of uniform thickness, when the lid, previously luted and ready, is placed in its position and screwed up as quickly as possible. The operation of charging a retort with the scoop does not occupy more than thirty or forty seconds, so that very little escape of gas can take place. Hence the scoop has come generally into use wherever the works are large enough to supply three men for the purpose of working it. The composition for luting the retorts is made generally of the spent lime from the purifiers, mixed with a little fire-clay or loam, and well worked up with water like mortar. In large works it is prepared outside the retort house and brought in by wheelbarrows as required. In dressing the retort lid with the luting, the workman uses a trowel, and works a little of it up on a board, and applies it all round the rim, taking care previously to clear off the old luting.

In small works, which do not permit of the necessary men being employed to work double retorts, single retorts, generally about eight feet long, are used. These

are charged by means of the shovel, and the process is necessarily more tedious than the scoop, and the expenses of labor for carbonization increased.

The beds or ovens of single retorts in very small works are placed side by side, and extend the length of the retort house. In works of larger magnitude they are placed back to back.

The number of men required to carbonize a given quantity of coal depends on the size of the works. At extensive establishments each man carbonizes from five to six tons of coal per day, whilst in small works, where iron retorts are used, often 25 cwt. is not attained. In Scotland formerly, and perhaps at present, it was sometimes the custom for the stokers to be engaged by piece work.

A very essential point in the carbonization of coal is to keep the interior of the retorts free from incrustation, and indeed, as far as possible, to prevent it taking place. This incrustation, as already referred to, is a solidification of the richest parts (the heavy hydro-carbons) of the gas, and when gas is subjected to a high pressure and great heat, these are deposited in great abundance.

It also entails several other disadvantages—it increases the fuel and labor; by its obstruction renders more retorts necessary, so increasing the capital invested; and wherever it abounds the coke is always of inferior quality. In iron retorts, where the heats are not so high as in those of clay, supposing both to be subject to the same pressure, this deposit does not take place so speedily; but it is always in excess in the hottest part of the retort, which is generally the closed end, and diminishes towards the mouth in proportion to the diminished temperature. It has often been considered that the exhauster was unnecessary wherever iron retorts were used; but wherever the incrustation of carbon occurs, either in iron or clay retorts, it may be taken as a direct proof of the necessity of that instrument.

When clay retorts are at the most advantageous temperature, the gas having a pressure of 18 or 24 inches in them, which is not uncommon when no exhauster is used; two or three weeks are sufficient for a very inconvenient accumulation of carbon in the retorts; but when the pressure is diminished by the exhauster to about one inch, the same quantity of accumulation would require from three to four months.

The mode sometimes adopted to clear out this carbon (the furnace being heated as usual), is to project from a tube a small jet of steam on to the crust attached to the roof of the retort. The oxygen of the steam combines with the carbon which gradually diminishes, and when sufficiently thin can be easily detached by means of a chisel bar, it being removed from the roof, like an arch without the key; the deposit of the sides breaks away in large lumps.

Others prefer a periodical cleansing by leaving the retorts exposed to the action of the atmosphere, the heats being kept up as usual; for this purpose the door is placed in its position, leaving about an inch space between it and the mouth-piece. The air enters and gradually cleanses the retort. It is always advisable to clear out this deposit before it becomes too thick; if neglected, its accumulation is very rapid.

In all coal, combined with the ash, there are particles of iron, lime, and other substances, which fuse and become slag, or clinker, which deposits itself between the furnace bars and stops the current of air. To effectually remove this the bars should be loose, and the clinker is readily detached by means of a suitable bar.

When the ascension pipes are placed too close to the furnaces, or when the wall of the furnace is not sufficiently thick, the pipes are heated to such a degree that the tar in its passage is deposited thereon, as pitch, so so causing a speedy obstruction.

Purification of Gas by a Prepared Iron Ore.

Messrs. W. H. St. John and Peter Cartwright, the inventors of a new gas-purifier bearing the name of "Prepared Iron Ore," claim it to be a valuable improvement having the following advantages: That it is "an entirely new preparation, containing no deleterious or foreign matter, acting very powerfully upon the impurities desired to be arrested, thereby purifying a much larger quantity per bushel than any other material known. It is adapted to the present apparatus generally used by gas companies throughout the United States. It is very simple, easily prepared and worked, on account of its porosity, which it maintains: there is no difficulty about pressure; will run about the same pressure as lime. It has been used at the New York gas-works, in the city of New York, for six months past, and the material, without any addition, is now performing the same work as it did at the commencement. By proper handling of the material, a considerable reduction of labor can be effected.

"The main features of this valuable agent are—that it has purified 70,000 feet of gas per bushel at the present time, and to all appearances will perform as much, if not more, than it has already done; also, in destroying that unpleasant and unhealthy odor of sulphide of hydrogen, which is so objectionable in all districts where gas-houses are located."

Any reference required may be had on application to the officers of the New York Gas-Light Company, Nos. 157 and 159 Hester street, or to the Superintendent at the Gas-Works, 21st street and Avenue A, New York.

A Bottle to Contain Liquefied Gas.

The use of protoxyd of nitrogen, or laughing gas, as an anæsthetic agent, is no novelty, and would not require notice but for a suggestion recently made in the *British Medical Journal*, which offers a problem to mechanics. It would be very inconvenient for surgeons to be driving about with large bags of gas for administration to their patients. There are inconveniences also in the preparation of the gas on a small scale which disappear when the manufacture is carried on in a moderately large way. Now, laughing gas can, by great pressure or intense cold, be condensed into a liquid, and the suggestion of the journal we mention is that liquid protoxyd of nitrogen shall be sold, from which at any moment, by merely turning a tap, a bag of gas can be obtained for inhalation. To carry out this idea, bottles are required which will stand a pressure of at least 800 lbs. The pressure at whice the gas liquefies is about 30 atmospheres at the freezing point, so perhaps for a bottle to be perfectly safe at an ordinary temperature it should be proved to 1,000 lbs. There can be no difficulty, we should think, in producing such a bottle of cast steel, so light that a surgeon might take it with him on his rounds, and if there are all the advantages claimed for protoxyd of nitrogen as an anæsthetic, there will probably be a considerable demand for such bottles. As regards the manufacture of the gas and its liquefaction, these are very simple matters; the desideratum of to-day is a safe and portable bottle to hold the liquid, and we have little doubt this will soon be furnished.—*Am. Artizan.*

Correspondence.

New Albany Gas Works.

New Albany, Ind., May 6, 1868.

Messrs. Editors: The following statement in regard to our works will give you some idea of what we are doing. During the month of April we had keys open to 360 meters and 140 street lamps, which required 20,000 feet daily to satisfy all demands. This we made with one bench of clay retorts, three in bench; dimension of retorts 8½ feet long, 12 inches high and 20 inches wide; oven 6 feet 6 inches wide; the usual charge for 13 days was 750 pounds every four hours; one day we charged 900 pounds every four hours. Retort No. 1 made during the month 100 pounds carbon, which took 38 hours by roasting process to remove. No. 2 made 25 pounds, which cleaned off in 20 minutes. No. 3 made no carbon. Our mouth-pieces weigh 330 lbs., lids 40 lbs., outlet from mouth 5 inches, tapering from 5 feet to 4 inches; leading to hydraulic 4 inch pipe; two bell washers in use 4 feet diameter; three lime boxes 4 feet diameter. I find that when a rod is inserted in dip-pipe of vacant bench there is 10 inches of liquor—hydraulic 13 inches. I also find when over 5000 feet per day is required of retorts, that the stand-pipes are worked beyond their capacity, and full 30 minutes is lost daily, by having to take the caps off and burn out the deposits, and no new charge can be made without cutting crust off inlet to stand-pipe, then running hot rods up and down to clear away for a new charge; yet with all this care we have to take off from six to ten lids every 24 hours with charges in them, to remove deposit; leakage from this source alone is not less than 10 per cent.; our loss beyond purifying room to the city is about 10 per cent.

I have an experience of twelve years, the first four years with iron retorts, during which time a circular was handed to me signed by about thirty superintendents, recommending the use of clay retorts; some one saying that he could make 5000 feet per retort per day; this assertion was received with a great deal of incredulity by me, but as I hold my situation from day to day by what little knowledge I possess, it was the means of stirring me up to a sense of my duty. Believing now that 30,000 feet per day could be made with ease, with the facilities some works have, were I to be told that 12,000 per retort per day, or one million per month, in the above-sized oven or less 33 per cent coke, by those who make the profession their study and combine with it the pleasures of science, I could not doubt it.

I do all the brick work and setting of retorts myself, also repairing. We make our own lime, burning it with coke, 75 per cent. cheaper than we could buy it. I also attend to the city department, which gives me plenty of amusement, and sometimes sorrow.

The proposed Convention, to those who wish to float above their profession, will be a feast of oily things. I certainly would like to mingle with so much talent, to hear them expatiate on the art and mystery of gas making. It would be a good idea to have retort and meter makers there, as I have to handle them daily, and a little consultation with each would do me some good, and much more to gas companies.

Being athirst for more knowledge, you will please put my name down for a copy of "Smedberg's Synopsis." Thankful for pearls dropped in your valuable Journal, and voting Cincinnati for the Convention.

I remain yours,

John Dunbar,

Sup't New Albany Gas Works, Ind.

[The above letter may be interesting to some as an exhibit of the nature of the workings and practice of some of our smaller works. We suggest that some of our engineers of small works make a comparison with their own experience and practice, and give the results for mutual information and benefit.—Eds.]

Smedberg's "Synopsis of Gaslighting."

Office Detroit Gas Light Co.,
May 10, 1868.

Messrs. Editors: Send a copy "Synopsis of British Gas Lighting" to the Detroit Gas Light Co. Order a Conventien to be held at Chicago, New York, or Philadelphia, but have the Convention in one of the above named places, and your humble servant will be there.

Very respectfully and truly yours,

P. E. Demill,

Sup't Detroit Gas Light Co.

Warren, Ohio, May 9, 1868.

James R. Smedberg, Esq.

Dear Sir: Please put my name down for a copy of your "Synopsis of British Gas Lighting." I am also in favor of the proposed Convention of gas men.

Respectfully yours,

William M. Lane,

Sup't Warren Gas Light Co.

The following additional subscriptions have been received, making 148 in all:

John Dunbar, Sup't Gas Works, New Albany, Ind.
William M. Lane, Sup't Warren Gas Co., Ohio.
San Francisco Gas Light Co., 2 copies.
George H. Kitchen, New York.
Dr. Calvin G. Page, 61 Myrtle street, Boston.
B. P. Bonner, C. E., San Francisco, Cal.
Col. W. Renwick Smedberg, San Francisco, Cal.
James Porter, Sup't Greenfield Gas Light Co., Mass.

Steam Raised by Gas.—The London *Builder* says a machine on Jackson's Patent, at Lyon's wharf, one of the granaries near Queenhithe, is exciting attention. The principle is the substitution of gas for coal, but in such a form that power can be obtained in a small space. The machinery which illustrates the working of the process was erected by Middleton, engineer, of Southwark, and in a space of about six feet by five feet the power is supplied for raising sacks of grain from the barges in the river at four different places at once. The boiler will generate steam from cold water in twenty minutes after the gas is lighted, and when once generated steam can be kept up by one burner at a trifling cost. It is proposed to apply it only where small power is needed.

Molecular Mobility of Gases.

Mr. Thomas Graham, F.R.S., Master of the Mint, London, has made some extended investigations upon the remarkable chemical phenomenon called *dialysis*. He noticed that certain substances possessed the power of diffusing themselves through water with greater facility than others, and he devised the agency of tubular diaphragms, called "dialysers," for the separation of different substances in solution. A new and useful branch of chemical analysis has already been established upon this invention; it has been applied to investigations in cases of poisoning, and for other purposes. Mr. Graham has given to the public the results of a series of interesting experiments on the "Diffusion of Gases," in a paper recently read to the Royal Society, and published in the London *Athenæum*.—The law of the diffusion of gases may be said to run counter to that of gravitation; and every breathing creature is dependent upon it for existence.

It may be briefly stated, the gases are of different specific gravity. Thus the specific gravity of oxygen is 100·000; hydrogen (the lightest), 62·398; carbonic acid, 138·219; nitrogen, 88·518 If hydrogen and carbonic acid be placed in a tube, the hydrogen, although it is so much lighter than the carbonic acid, will not float upon the top, like oil upon water; but the heavy gas will ascend and the lighter gas descend, the two becoming perfectly diffused. How beautifully adapted is this law of gaseous diffusion to the sustenance of life!

The atmosphere is composed of 79 parts nitrogen and 21 parts oxygen; or about one of the former to 4 of the latter, with a very small quantity of carbonic acid. Were it not for the law of gaseous diffusion, the gases would arrange themselves in the atmosphere according to their densities, and the whole surface of the globe would be covered, first with carbonic acid several feet in depth; then with oxygen, constituting one-fifth of its amount; and lastly, above these, a great envelope of nitrogen. In 2,401 parts of air, the proportions are: oxygen, 500; nitrogen, 1,900; carbonic acid, 1. As the air is a mechanical mixture, only for this law of gaseous diffusion, no human being could live on the surface of the earth, for carbonic acid is a poison to the lungs; while the breathing of pure oxygen so stimulates the physical system, that animal life can exist but for a very short period under its influence. The proportions of oxygen and nitrogen in the atmosphere are constant—the same in all parts of the world, at all seasons of the year—and their diffusion is so perfect, that no difference can be detected in air at the level of the sea, and that in a balloon at an elevation of five miles.

The notion was once entertained that the gases of the atmosphere arranged themselves like fluids of different specific gravities; and it was held that hydrogen gas, being the lightest, formed the top envelope of all. Dr. Priestly first directed attention to the penetration of gases through porous vessels; but the celebrated John Dalton discovered that light and heavy gases diffused through each other by a peculiar law belonging to themselves. He filled one bottle with oxygen, another with carbonic acid gas, and connected their necks together by a tube—the oxygen being placed upon the top of the vessel containing the heavy carbonic acid. Contrary to the action of gravity, the heavy gas spontaneously ascended, and the light gas descended; and the two soon became so perfectly mixed, that the proportions were the same in both bottles.

Several years ago Mr. Graham made a most thorough series of experiments in the investigation of this subject, using a glass tube with a porous cap of plaster of Paris called a *diffusiometer*, through which the gases passed. Recently he found a better substance than the plaster, in artificial graphite, which led him to make a fresh series of experiments. He used his *diffusiometer*, consisting of a glass tube, ten inches in length, half an inch in diameter, and closed at one end with a cemented disk of artificial graphite about the thickness of a wafer. When the tube was filled with hydrogen over a mercurial trough, gaseous diffusion immediately began to take place through the pores of the graphite, the hydrogen passing out and air passing in through the pores of the graphite, which are so minute that gas in mass cannot penetrate them; for only molecules can flow through, and these are supposed to pass unimpeded by friction. The sole motive agency appears to be an intestine movement of molecules, which has been recognized as a property of the gaseous condition of matter.

A hypothesis has been advanced and received, that a gas consists of solid and perfectly elastic spherical atoms, which move in all directions, and with different degrees of velocity. When confined in a vessel, it is supposed that these atoms are constantly impinging against its sides, and against each other, without any loss of motion, owing to their perfect elasticity. When contained in a glass vessel like the diffusiometer, with a graphite cap, the gas atoms pass through the pores by their atomic motion, and the external air or gas passes in by the same force, taking the place of the escaping gas. And this result is effected whether the gas in the diffusiometer is either heavier or lighter than the air on the outside, only the diffusion is more rapid when the lightest gas is placed in the tube. To this molecular movement the elastic force which gas possesses is due in resisting compression. It is remarkable that when the same gas is present in the inside and the outside of the diffusiometer, the movement of the molecules goes on; they continually enter and leave the tube without change of volume. What a beautiful and beneficial law is that of molecular movement, or diffusion of gases! By it the poisonous gases emitted from the lungs of living creatures, and given off from the combustion of fires in great cities and villages, as also the exhalations of fermenting matter, are, by self-movement in their atoms, taken up and diffused through the atmosphere, and their places supplied with air capable of sustaining life. How wonderful are the designs of the great Creator of the Universe; upon this simple law of diffusion the existence of all animated nature depends.

Impurities in Water.

The ordinary impurities of the water supply of cities consist in a certain proportion of organic matter and salts, which detract from its digestibility and likewise render it in a measure unfit for washing. The quantity of the organic matter, which of these impurities constitutes the most objectionable portion, is very variable, according to the locality, and can only be determined with any degree of exactitude by ultimate analysis, by collecting both the organic and inorganic carbon, the whole of the nitrogen, and the quantity of the latter in combination with oxygen (as nitrate and nitrite) and with hydrogen (ammonia). It has been customary for some time past to employ, both as a qualitative and quantitative test for the presence of organic matter, a solution of permanganate of potassa, which is decolorized by organic substances. But recent researches of Dr. Frankland have demonstrated that this reagent is unsafe as an indicator of the quantity, inasmuch as scarcely any of the organic substances that might be looked for in running water are at all approximately destroyed by it, which would involve the decolorization.

Oxalic acid, which is ordinarily used as the normal test of the permanganate solution, is of course readily indicated; but of the other substances only a small proportion of the amount present in the water acts on the reagent in the same manner, necessarily causing very serious misstatements regarding its purity. While a certain proportion (3 in 100,000) of oxalic acid completely decolorizes the proportion of permanganate estimated almost instantly, it requires more than six hours for solutions of equal strength of the following substances to react on certain small fractions of the same quantity of permanganate. Instead of 100 p. c. destroyed in the case of oxalic acid, a solution of gum-arabic destroys only 9·3 p. c. of permanganate:

Cane-sugar	3·7 p. c.
Starch	8·0 "
Glue	48·8 "
Kreatin	4·6 "
Alcohol	4·0 "
Urea	3·1 "
Uric acid	16 0 "

while in a solution of nitrite of soda the same reagent indicates almost double the quantity of the salt actually held in solution.—*Dingler's Journal.*

Preparation of Whitewash.—Whitewash is one of the most valuable articles in the world when properly applied. It not only prevents the decay of wood, but conduces greatly to the healthiness of all buildings, whether of wood or stone Out-buildings and fences, when not painted, should be supplied once or twice every year with a good coat of whitewash, which should be prepared in the following way:—Take a clean water-tight barrel, or other suitable cask, and put into it half a bushel of lime. Slake it by pouring water over it, boiling hot, and in sufficient quantity to cover it 5 in. deep, and stir it briskly till thoroughly slaked. When the slaking has been thoroughly effected, dissolve it in water, and add two pounds of sulphate of zinc and one of common salt; these will cause the wash to harden, and prevent its cracking, which gives an unseemly appearance to the work. If desirable, a beautiful cream color may be communicated to the above wash, by adding three pounds of yellow ochre; or a good pearl of lead color, by the addition of lamp, vine, or ivory black. For fawn color, add four pounds of umber—Turkish or American, the latter is the cheapest—one pound of Indian red, and one pound of common lampblack. For common stone color, add four pounds of raw umber, and two pounds of lampblack. This wash may be applied with a common whitewash brush, and will be found much superior both in appearance and durability to the common whitewash.

T. F. ROWLAND.

Continental Works,

Greenpoint, Brooklyn, N. Y.

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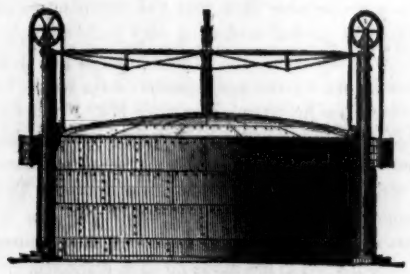

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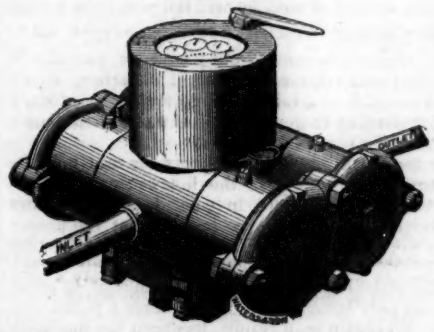

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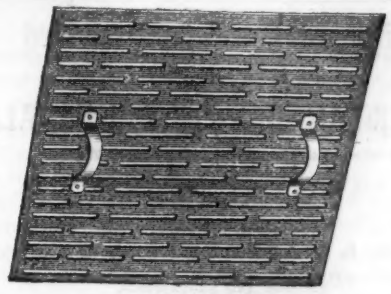

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M. L. CALLENDER & CO.,

EDITORS AND PROPRIETORS.

SATURDAY, MAY 16, 1868.

WISHING TO MAKE this Journal an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of those subjects a pleasure, or a profession.

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Answers to Correspondents.

J. S., OF CHICAGO.—By forcing, by means of an ordinary blow pipe, the flame of coal gas for about a minute on to distilled water, containing a little acid chloride of barium, sulphate of baryta is formed, and the presence of sulphur in the gas thus proved.

M. K., OF OHIO.—Apply either litmus paper or yellow turmeric paper, reddened by vinegar or any other weak acid, to a jet of gas, unlighted; if the blue color of the litmus paper returns, or the color of the turmeric paper deepens to a brown, the gas contains a proportionate amount of ammonia.

E. S. P., OF BOSTON.—A good cement for steam, water, and gas pipes, retorts, etc., is made with 10 lbs. of litharge, 4 lbs. ground Paris white, ½ lb. yellow ochre, and 2 lbs. red lead. Another: Take half an ounce of hemp, cut into half-inch lengths, mixed together with boiled linseed oil, to the consistence of very stiff putty; make the joint in the usual way. This cement resists fire, and will set in water. It answers well for pipe joints, leakages in boilers, cisterns, or any other purpose requiring a durable cement: see that the whole is well ground and mixed together.

C. R. L., OF ST. LOUIS.—When it is absolutely necessary that the meter be placed outside the house, or in an exposed situation, it should be protected from extremes of heat and cold by surrounding it with old woollen cloths, or with dry sawdust to the thickness of two or three inches, for which latter purpose a wooden case will be required.

CHLORIDE OF MAGNESIUM.—It has been announced that chloride of magnesium can unite and associate with magnesia, forming an oxychloride of magnesium, perfectly insoluble, and possessing the property of taking all variety of forms in a degree incomparably greater than plaster of Paris. It is also capable of taking a high polish of a great number of substances with which it may be mixed, in the proportion of a fifteenth to a twentieth of their weight. The same is sold for meerschaum pipes.

COAL GAS AND HYDROCARBON GAS.

It is a remarkable fact that the manufacture of illuminating gas has made but very little advancement, as an art, since DR. HALES first burned it as it issued from a punctured bladder, as a source of amusement for his friends; or since MR. MURDOCH, in 1792, (nearly a century ago), conceived the idea to manufacture and substitute it for lamps and candles, and brought it into successful operation. The mechanical department of gas manufacture, in its various details, has been somewhat improved; but even here invention has made no such marked changes as can be found in almost every other art or branch of manufacture. Viewed upon abstract and speculative principles as a science, it is easy for the chemist to understand the changes that occur in the process of distilling coal or other carbonaceous materials into gas. He can analyze the material, and thus, knowing its elements, will give a correct estimate of results that should be obtained by its decomposition and resolution into its primary elements, such as occurs in the destructive distillation of coal, for instance, to make illuminating gas. If, however, he examines the process as carried on in our best conducted gas-works of the present day, he will find the results obtained entirely inadequate to his anticipations, founded upon chemical laws. A certain amount of coal, he will tell you, should yield a given amount of carbon, hydrogen, oxygen, nitrogen, sulphur, ammonia, etc.; and as gas should yield a given volume and weight of carbon, which with its full equivalent of hydrogen, to produce carburetted hydrogen, would be more than double that usually obtained.

It has been admitted in theory for nearly half a century, that to obtain the full equivalent of gas (carburetted hydrogen) in coal distillation, more hydrogen is required to be furnished at the proper time to combine with the surplus of carbon; or that the hydrogen should be evolved at an earlier stage of the process, at a temperature sufficient to enter into its new combination, and produce a permanent gas. To obtain such results, has been the incentive to much study, numberless experiments, and an expenditure of many millions of dollars—all alas! in vain, so far as real practical results are concerned, until within a few years.

The general efforts have been made both in Europe and in this country, to supply the extra hydrogen needed by the decomposition of one of the cheapest and most abundant elements in nature—viz., water. Indeed, what two elements in nature can be supplied more abundantly than coal and water, for the production of so important a staple, so essential to the comfort and for the luxury of mankind, as gas?

Hydrocarbon Gas.—This is the name given to the mixed gases which are generated from water, and certain substances rich in hydrocarbons, as tar, resin, fats, oils, and *bituminous* and other coals. Although this description of gas has only recently been made on a large and *successful scale* practically, yet the principles of its manufacture were known and appreciated, and attempted to be produced many years ago in Europe, as before stated. As proof of this, and to show the cause of failures in these early attempts, we shall refer to the history of these experiments somewhat:

As far back as the year 1830, Mr. Donovan took out a patent for the generation of gas from steam, by passing it over red hot coke or charcoal; and he subsequently naphthalized it at the burner by means of turpentine or coal tar. Since that time many improvements have been made in the process; and we refer to the names of Manby, Val-Marino, Radley, Lowe, White, Croll, Webster, Barlow, and Gore, in proof of the number of persons who have taken out patents in this country, for the generation and naphthalization of water-gas. In every case, the water, or rather the steam, is decomposed by passing it over red hot coke or charcoal; and it is subsequently naphthalized by mixing it with rich hydro-carbons.

The details vary somewhat with the nature of the materials used. When fat or resin is employed for the production of the gas, the process, as operated by Mr. White in his patent, consists briefly in employing two vertical and two horizontal retorts, set in the same furnace. The first-named retorts are filled with coke, charcoal, etc., and scraps of iron. When the retorts are red hot, water is allowed to flow upon the top of the ignited mass. The steam thus generated is decomposed by passing down through the red hot carbon, producing "hydrogen and carbonic oxide, with more or less carbonic acid." These "*gases*" and "*vapors*" then pass into the horizontal retort filled with "coke, chain, or coils of iron wire." Into these, tar, fat, or resin is allowed to flow, so as to undergo decomposition, and the evolved gases carried off and mixed with the gaseous products of the first retort; thence passed through the condenser and lime purifier and to the gasholder.

Dr. Frankland entered into a very detailed examination of this process; and it appears from his report, that a hundredweight of resin, with from 30 to 40 pints of water, will yield from 1500 to 1900 cubic feet of gas, and from two to four gallons of oil. The temperature at which the best results are obtained is that of dull redness, for if the heat be carried much above this point, the richer gases are decomposed, and evolved into several gases of low illuminating powers. He found that two distinct changes were effected in the water retorts. In one case the steam was decomposed by the red hot charcoal, and resolved into equal volumes of hydrogen and carbonic oxide; in the other, it was converted into two volumes of hydrogen, and one of *carbonic acid*. These mixed gases, together with some *undecomposed steam*, pass into the resin retort, where they mix with the vapors of the decomposing resin. Here the steam is again subjected to decomposition by the agency of fuliginous matter evolved from the resin. This change is a very important one, for it prevents the accumulation of carbon in the exit-pipe of the retort. If the gas be examined at this stage of the manufacture, it will be found to contain a very large proportion of *carbonic acid*; and one of the *greatest difficulties* in the subsequent management of the gas is the removal of this *impurity*. Ordinary wet lime will only remove a portion of it; and hence Dr. Frankland has recommended the use of caustic soda, which may be produced by the admixture of carbonate of soda with the cream of lime.

The gas which is thus produced, has a specific gravity of from ·600 to ·660. It contains from 7 to 8 per cent. of condensable hydrocarbons, and its illuminating power is about the same as that of ordinary cannel gas. Its composition, both before and after the removal of carbonic acid, is as follows:

	Ordinary Gas.	Pure Gas.
Condensable hydrocarbons	7·41	8·13
Light carburetted hydrogen	26·50	29·71
Hydrogen	40·27	43·38
Carbonic oxide	18·55	18·78
Carbonic acid	7·27	0·00
	100.00	100.00

According to Dr. Frankland's report, hydrocarbon gas from steam and resin may be manufactured at from 9½d. to 1s. 1½d. per 1,000 cubic feet. This is irrespective of the cost of the apparatus or the charge for wear and tear.

When the gas was made from coal, the arrangement of the apparatus was a little different from the preceding; but the same in general principles, The coal taking the place of the tar, resin, fat, etc. The distance the steam traveled over the incandescent carbon was greater, however, both before and during naphthalization; or more properly, perhaps, carburetting.

Dr. Frankland states that by this mode of working all the *carbonic acid* which is generated in the water-retort is decomposed by the "fuliginous" matter of the coal, and converted into twice its bulk of carbonic oxide. It is thought also, "that the water-gases exert a conservative influence on the rich hydrocarbons which are evolved from the coal; and that by sweeping them away as fast as they are produced, and so protecting them from the *destructive* agency of heat, a much larger quantity of illuminating matter is obtained."

Dr. Frankland examined the value of this process, as applied to different varieties of cannel coal. He worked with one hundredweight of each of the following coals, and obtained the following amounts of mixed hydrocarbon gases. The coals were distilled at a low red heat. The water-gas was obtained in the usual manner:

Name of Coal.	Yield per Ton in cubic feet.	Illuminating Power of the Gas in sperm candles.
Wigan, (Ince Hall)	16·120	20·0
" (Balcarres)	15·500	19·1
Newcastle Cannel	15·020	18·8
Methyl	26·400	21·0
Lesmahgo	29·180	28·7
Boghead	51·720	17·9

The illuminating power was tested in the usual way with a No. 4 fish-tail burner, consuming five cubic feet per hour, at a pressure of half an inch of water, and the candle was a sperm candle, calculated to the amount of 120 grains per hour. According to Dr. Fyfe's mode of estimating the value of the gas, an average sample has a durability of 43·20 inches, and its amount of condensation by chlorine was 11·44 per cent., so that its quality was about 2¼ times that of ordinary gas from Newcastle coal. Mr. Clegg speaks in the most enthusiastic terms of the value of this process. He says that a ton of Wigan coal yields, under ordinary circumstances, about 10,000 cubic feet of twenty-candle gas; while with the hydrocarbon process, it furnishes 16,000 cubic feet of gas of the same quality, and 26,000 cubic feet of twelve-candle gas. A ton of Lesmahgo cannel produces, in the usual way, 19,500 cubic feet of forty-candle gas: but with the hydrocarbon process, it will yield 36,000 cubic feet of twenty-candle gas, or 58,000 cubic feet of twelve-candle gas; and a ton of Boghead, which generally furnishes about 13,500 cubic feet of forty-candle gas, will, by this process, give as much as 52,000 cubic feet of twenty-candle gas, or 75,000 of twelve candle gas. From which it is manifest that, although there is a comparative reduction of the illuminating power, in consequence of the diluting power of the water-gas, yet, on the whole, there is a considerable increase in the amount of illuminating matter. This increase varies from 50 to 100 per cent., and it is no doubt due to the property which water-gas has of suspending the volatile hydrocarbons which are generally condensed in the tar.

Mr. Clegg states that the cost of working the process is not very considerable, for gas of twenty-candle power may be obtained from Wigan cannel at the rate of 1s. 3½d. per 1000, from Lesmahgo at 11½d., and from Boghead at 11d.; beside which, the gas is remarkably free from every kind of sulphur compound.

The conclusions at which Dr. Frankland has arrived, after having made a very careful examination of Mr. White's process, are the following:

1st. That it greatly increases the produce of gas from a given weight of coal, the increase being from 46 to 290 per cent., according to the nature of the material operated upon.

2nd. That it greatly increases the total amount of illuminating power, the increase being from 12 to 108 per cent.

3rd. That it diminishes the quantity of tar formed, by converting it into gases of high illuminating power.

4th. That it affords a means of reducing the illuminating power of gases which could not be profitably burnt alone; and,

5th. It may be easily applied to any of the apparatus or modes of working now in use.

Cause of Failures in England.—These results are certainly most wonderful, and considerably in advance of anything claimed by the hydrocarbon process now before the public, called the "Gwynne-Harris Process;" and if such results could have been kept up without drawback, nothing better could have been desired. But it was found that the process was impracticable, owing to the rapid destruction of the decomposing and distilling retorts (which were iron) by oxydization, and the formation of a *solid oxide* of iron in the retort, which could not be removed.

Again, the variable and inevitable reduction of temperature, owing to the evaporation of water in the retorts, made it impossible to obtain uniform results. Carbonic oxide and hydrogen would be eliminated satisfactorily where the heats were at the proper point; but this was only just at the beginning of the process. If continued, the heats soon fell, and *carbonic acid* and free *steam* would be evolved and enter the carbon retorts, completely neutralizing any possible benefits. Hence, the reason, after such promising beginnings, all these inventions have failed to come into practical operation, leaving it to America to reduce the process to a positive permanent success.

The Gwynne-Harris Process.—This process is operated upon a new system secured by several patents both here and in Europe, and has been in practical operation over three years. The obstacles encountered by former experimenters are here completely overcome.

Steam is generated in an ordinary steam boiler, and then conducted into a "dryer," as it is called, and then into a *porcelain or clay superheater*, where it obtains a high temperature and tension. It is then conducted to the "*decomposing retort*," which is also made of clay. It is here subjected to the action of incandescent carbon, which fully decomposes it and the resultant gases are introduced into the other retorts containing bituminous coal, where the process is completed.

As most large gas-works have a steam boiler, it only requires the connecting pipes to the "dryer and superheater," which are inserted at the bottom of the bench. In the usual settings of three or five retorts, one retort only is used as a "decomposer," which furnishes hydrogen for all the other retorts in the bench.

The very high temperature at which the hydrogen is admitted into the distilling retorts, *almost instantaneously elevates the temperature* of the fresh charges to the point of destructive distillation, and seizes upon and decomposes the volatile condensable vapors, converting them into a largely increased volume of highly illuminating gas.

The retorts, superheater, etc., are not oxydized like iron, and are consequently lasting; no "chains," "scraps of iron," etc., are employed to decompose the steam to form a solid, immovable mass, but anthracite coal instead, which is gradually consumed and converted into the gas, carbonic oxide, while the hydrogen is left free. Owing to the high temperature and tension of the steam, it is easily converted into gas without reduction of temperature. Hence, a perfectly uniform quality and quantity of gas is obtained at all times. No carbon is formed in the body of the retort, as is the case in ordinary practice. It materially shortens the usual process, from two to three hours being amply sufficient to work off a charge. An average of six and one-half cubic feet per pound of coal has been obtained for many months practically, as compared with four feet obtained in the ordinary way, with the same quality of coal. It is not improbable 100 per cent. may begained, everything considered, by this process.

Heating Gas.—By leaving out the distilling retorts the process is materially simplified, as the "decomposing retort" requires adding to the charges only once in 24 hours—one-sixth its capacity

Hydrogen and carbonic oxide alone are then made; and one ton of anthracite coal and 720 pounds of water will produce theoretically 126,000 cubic feet of gas, at a cost of about 25 cents per 1000. From this statement some estimates may be made by the searcher after comfort and economy of the value of so cheap a gas as this as a substitute for coal or fuel of any other kind.

INCIDENTAL ITEMS.

Book-keeping for Gas Works.—In our next number we will commence to publish, in sections, a system for keeping the books and accounts of gas companies. This is something that has long been needed—a comprehensive and uniform system which every one can understand, and which at the same time is simple and complete.

This work is compiled by W. P. Fodell, Sec'y of the Northern Liberties Gas Company, Philadelphia; a gentleman of long experience in the business. and who has given much time and study to the subject, which eminently qualifies him for this peculiar work. We feel assured that the announcement of this forthcoming work will be hailed with pleasure by a large number of our gas companies, because it will afford a correct and complete system of accounts, etc., which will materially lessen and simplify the labors of the officers of the company, and bring everything legibly before the eye at a glance almost. We shall proceed to publish the work in book form as soon as we can get a sufficient number of subscribers to warrant us for so doing. The work will be 12 mo., and about 50 pages. The price will be $3.00 in cloth.

New Improvement in Gas Meters.—We refer gas men and gas consumers with pleasure to the description, to be found elsewhere, of a new improvement in gas meters, invented and patented by James W. Mahlon, of New York City. We have examined it critically, and are convinced that it overcomes completely the liability to accumulation of water in the working parts, whereby an unsteady light is so frequently produced, and oftentimes total darkness supervenes, generally at a moment the most unexpected and disagreeable—during the convivial ceremonies of the table, or perchance, in the midst of social festivities, when the "light fantastic toe" is tripping to the time of "music's voluptuous swell." How delightfully interesting, to be on the point of taking the charming Miss Seraphina's hand for the waltz, to be struck with temporary blindness because, forsooth! the gas has gone out, and wont burn until a plumber has been called to manipulate the meter. By this improvement, the turning of a screw withdraws all moisture in a moment.

New Material for Gas Purification.—Elsewhere will be found a notice of a new gas purifier, called "Prepared Iron Ore." The article is a preparation of oxide of iron with some other substance which is capable of regaining its purifying qualities over and over again almost perpetually, except for the loss by handling. The New York Gas-Light Company have been using this material for 6 months past with great satisfaction, we are told. Messrs. W. H. St. John and Peter Cartwright are the inventors.

We are in receipt of letters from Mr. James R. Smedberg, mostly written at sea, but mailed at San Francisco, wherein we are assured of his safe arrival at the point of destination, after a comparatively pleasant voyage. His letters are characteristic, and so graphically descriptive, that we imagined ourselves back again on the quiet and glassy Pacific, experiencing the "hot, hotter, hottentot, hottentotter, hettentissimus" temperature of that ever to be remembered tropical ocean. The mention of an early indiscretion of a former editor of this Journal, in publishing a certain poetical effusion was new to us, and we smiled audibly and incontinently to think we had, innocently, just re-committed the same unpardonable sin, wherefore we will make the *amende honorable*. We are pleased to inform our readers that the articles on the "Practical Management of Gas Works" will be immediately resumed by Mr. Smedberg. We are authorized to give $10 per volume for Volumes I., II., III., IV. and V, of the American Gas-Light Journal, to complete a set for Mr. Smedberg, and we will be glad to have some one supply us.

We not long since had the pleasure of a call from our friend and valued correspondent, "Out West," the champion of "high heats," clay retorts, and other improvements in gas manufacture of a progressive nature. We shall expect to meet him again at the "Convention" at Cincinnati, on the 23d of June next.

Mr. George Rugan, who so ably and earnestly advocated for the Convention under the initial *de plume* "R,"—and in fact was the first to propose it—will also be present, and among other interesting subjects, will, doubtless, take up the question of iron retorts *vs.* clays, remembering, of course, the evils Burns speaks of when he says:

> "Ah me! what perils do environ
> Him that handles the hot iron."

The Oxy-Hydrogen light, formerly described in this Journal as being on exhibition at the Tuilleries, Paris, before the Emperor Napoleon, with such success, is on exhibition in this city at 20 Nassau street. Messrs. Stern, Stevens & French are the operators and owners of the patent in the United States. The gas used is oxygen, about 2 volumes of which combine with 1 volume either of coal-gas or hydrogen, producing intense heat and light. The oxygen costs about $12 per 1000 cubic feet. The heat is said to be of great intensity, compared with ordinary gas-light. We shall revert to this again.

THE CONVENTION.

We are receiving letters from all quarters expressive of the satisfaction of the writers that the Convention of gas engineers and others interested in the manufacture and operation of gas apparatus, is set for the 23d of June next, at Cincinnati, Ohio. We feel that this will be an event of uncommon interest to all who participate, and certain to result in much benefit to the gas interests throughout the country. It will be, undoubtedly, the initiative of other movements of a similar nature from time to time, and lead to the establishing of a unity of action and harmony of feeling among the representatives of gas and gas works interests, which will tend greatly to advance the art in its scientific as well as mechanical bearings. In a social point of view, the movement has more than ordinary importance. The day is rapidly approaching when this great interest will have its social and scientific societies, giving a status and character to the art such as it deserves, when to be a member of any one of them will be a distinction and an honor to be sought for.

Owing to the press upon our columns, we have been obliged to omit the "Patent Claims."

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EXTRACTS FROM TESTIMONIALS.

These pipes can be laid with much greater facility than the common joint, are tighter when laid, and more secure against any disturbance of the joint by action of time or other causes.
In my judgement, the Robbins Joint is superior to any mode yet presented for connecting gas mains. H. J. MILLER,
Cincinnati Gas Company.

After using it extensively, and testing it thoroughly, I am fully persuaded that, as a connection for street mains, the "Robbins Joint" has no equal.
Its superiority consists of facility in laying, economy in time and lead, and, above all, its perfection as a Joint, thus saving largely in leakage. H. STACEY, Superintendent Indianapolis Gas Co.

We are entirely satisfied with the "Robbins' Patent Joint" for connecting our street mains. R. SALTER, Superintendent,
Covington Gas Company.

All the pipe laid have been tested by hydraulic pressure, and carefully put down, mostly, with the Robbins Patent Joint.
Experiment has fully demonstrated that said joint is entirely reliable, infinitely superior, and more economical than any other we have seen.—Annual Report of Sup't Cincinnati Water Works.

The experiment of laying the first lot of patent pipe has been concluded to my satisfaction. Your pipe layer laid 1200 feet in ten hours, notwithstanding numerous obstructions, such as rain, mud and water in the trenches. curves and crossings at intersections. E. W. BAILEY, Sup't Evansville Gas Company.

The quantity of Gas saved by using Robbins' Joint for street mains is of the utmost importance to gas companies.
R. T. COVERDALE, Gas Engineer.

As there is always a large difference between the quantity of gas made at the works, and the quantity for which the Company receives pay, any improvement that will reduce that loss must be very important to owners of Gas Works. We claim this desideratum for the "ROBBINS' JOINT."
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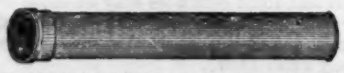

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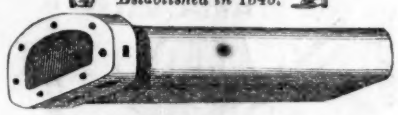

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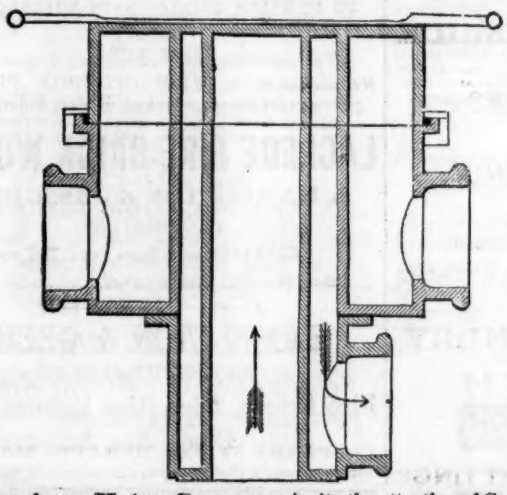

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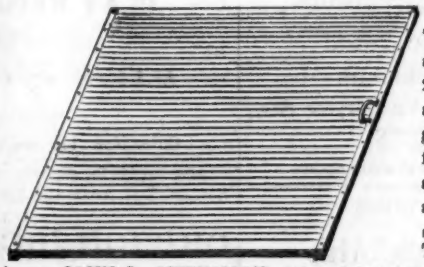

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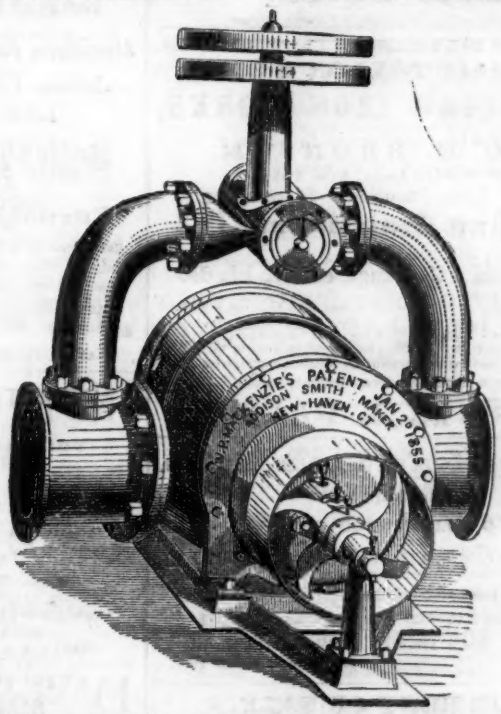

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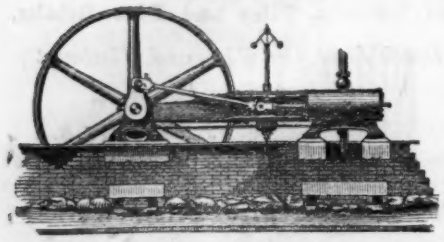

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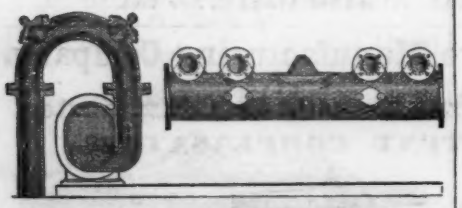

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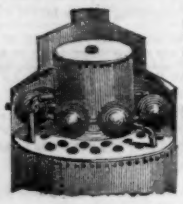

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Fig 3

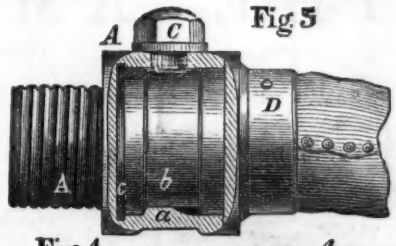
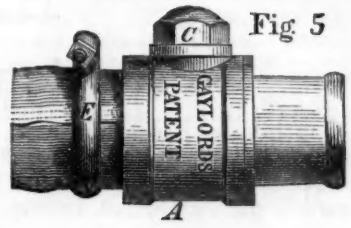


Fig 4

Fig. 5



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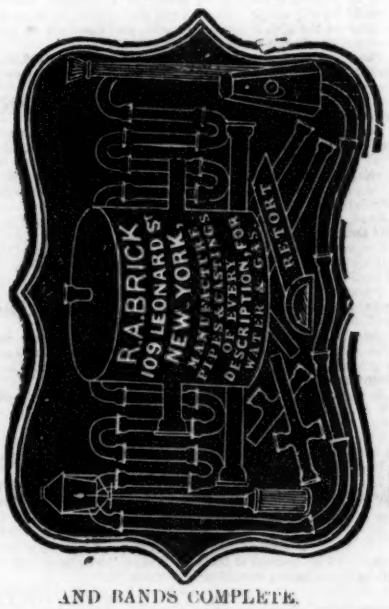

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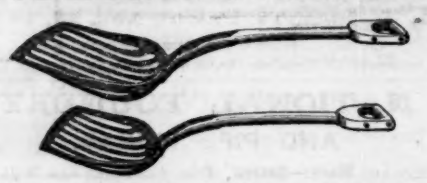

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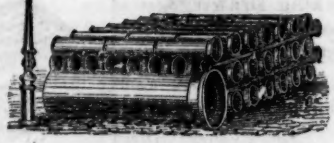

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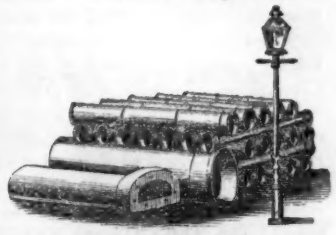

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Every Saturday, the elegant Side-Wheel Steamships

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SAN JACINTO,
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Have been placed on the route to Savannah by the Atlantic Mail Steamship Company of New York, and are intended to be run by them in a manner to meet the first class requirements of the trade. The cabin accommodations of these ships are not excelled by any Steamers on the coast, and although their carrying capacity is large, their draught of water enables them to insure a passage without detention in the river

San Jacinto,	Saturday, Oct.	6
San Salvador,	"	" 13
San Jacinto,	"	" 20
San Salvador,	"	" 27
San Jacinto	Saturday, Nov.	3
San Salvador	"	" 10
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San Salvador,	"	" 24

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NEW PATENT

Pianos.

RAVEN & BACON.

(Established 1829.)

Warerooms Nos. 644 & 646 Broadway, N Y.

Manufacturers of Piano Fortes, with their Patent Combination Sounding-boards,

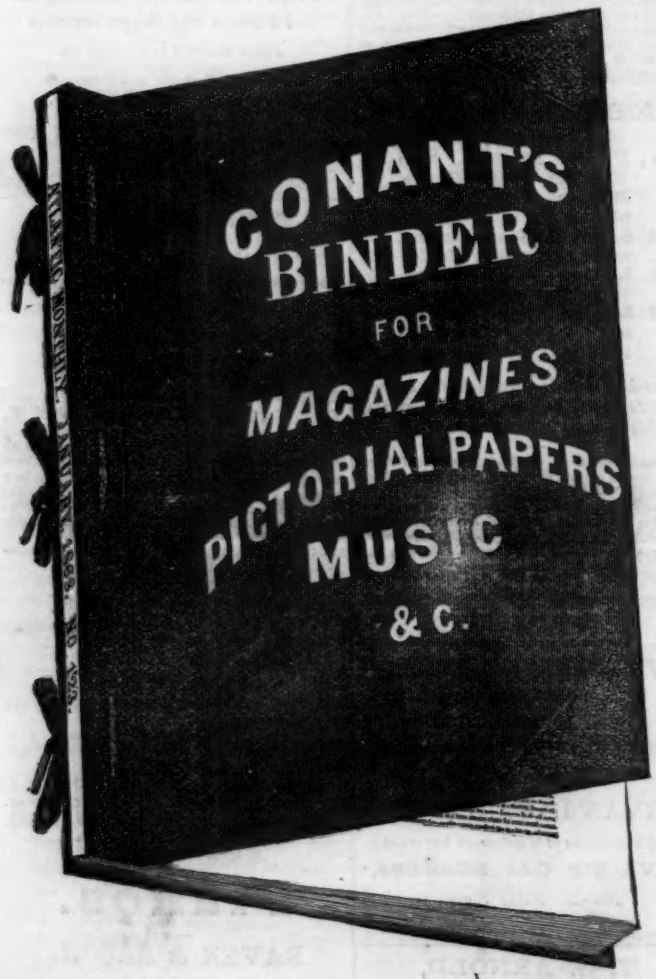
PATENTED AUGUST 14th, 1866.

This invention, introduced exclusively into our Pianos, is of the greatest advantage to the tone of the Instrument, as it affects the sounding-board the very soul of the Piano, and produces thereby a pure liquid tone greatly superior in quality and power to that of the ordinary Piano. The sounding-board released from its connection with the Piano case, and resting upon under sounding-boards, is relieved from the rigidity caused by such connection, and its vibratory quality increased. Our Pianos are first class in every respect, and purchasers will have not only our own guarantee as to their quality, but also the guarantee of the reputation of the instrument, obtained from the experience of our patrons who have used them for a generation. All lovers of this eminently household instrument, as well as parties proposing to purchase new Pianos, are invited to call and examine our assortment. 96-1y

Conant's Binder.

The value of some simple, cheap, and efficient method to secure magazines, papers, and music, etc., in temporary binding, without the necessity of waiting till the volume is complete to bind it in book form, is apparent to every one. For keeping papers cleanly and in good order, without liability to get mislaid or lost, the Conant Binder, shown in the accompanying engraving is just the thing. It is so simple a child can use it, and it is cheap and durable. The successive papers are secured in regular order, the same as when regularly bound. The boards or cover is provided at the back with a rigid piece pierced with holes; these holes correspond with other holes to be made in the papers, and a metallic pointed tape is passed through the whole and tied in a bow knot on the opposite side. This completes the operation.

The press and the public speak highly of this excellent invention, and we commend it also without any reservation, as the best we ever saw.



R. Conant, Jr., 39 Nassau street, New York, is the inventor, who will give any further information desired. Sold by all booksellers, stationers and news dealers.

Miscellanea.

—The Boston and Albany Railroad are about to substitute spermaceti and lard oil lamps, in place of kerosene, for illuminating their cars.

—The *Denver News* says Mr. Sartell is developing a vein of coal about three feet thick, on Deer creek, 15 miles above Denver. The vein is opened about one mile from the Platte river, and the coal is said to be of excellent quality.

—A Swiss inventor, it is said, has addressed letters to several European governments and to our own, stating that he has discovered a motive power which supersedes steam. He asks $10,000,000 for his secret.

—A Bostonian has invented an engine of one-boy power, which will throw water through a chemically prepared chamber of the machine, and in one minute, with ten gallons of water, extinguish fifty-three blazing tar barrels.

—In California attention is being turned to other metals besides gold. The Legislature has passed a bill offering a premium of five dollars a ton on the first thousand tons of pig or blast iron produced in that State from native ore.

—Mr. Lamey, of Astoria, Oregon, has discovered a cement bed near that place. It is said to equal in quality the celebrated Maine cement, so extensively used for building purposes in the United States.

—The Pacific Railway, at the close of 1867, had been constructed for 650 of the 1800 miles between Omaha and San Francisco. By the close of 1868, 500 miles more are promised, and it is expected that by July 1st, 1870, the locomotive will run the entire distance between New York and San Francisco in six days' time. Fifteen thousand men are employed in the construction of the Pacific railways.

—Dr. Hoffman, says the *Mechanics' Magazine*, has announced the discovery of a new acid which bearsthe same relation to napthaline that acetic acid bears to marsh-gas. Recently the same eminent chemist communicated to the Royal Society of London the discovery of "the mustard oil of the ethyl series."

—The directors of the Pennsylvania Railroad Company have declared the usual cash dividend of three per cent., and a stock dividend of five per cent, out of he earnings of the company for the last six months, both of which are payable to stockholders, clear of National and State tax, after the 30th inst.

—A cask containing about eight gallons of coal oil, exploded in the house of Mr. James Mays, near Guelph, Canada, just as the family were sitting down to dinner, and the flames enveloped the room and burnt the house in a short time. The origin of the explosion is not known.

—The enterprise of Chicago is unbounded, The tunnel under the Chicago river will be completed next year, and plans have already been made for a second one. It is anticipated that in a few years there will be six or eight tunnels under the river and its branches. These streams run through the heart of the city, and at present are crossed by revolving drawbridges The street and river trade are both enormous, and they constantly interfere with each other.

Advertising Index.

☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

GAS-BURNERS, APPARATUS, ETC.

Arnold's Metallic Gas Trays—T. G. Arnold, 334 and 336 West 21st street, N. Y.. 2
American Meter Company, 512 West 23d street, New York..... 8
Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the American Gas-Light Journal..... 2
Builder of Gas Works, Apparatus, Etc.—P. P. Deily, 39 Laurel street, Philadelphia..... 2
Gasoleine,—J. W. Wheelock, 284 Pearl st., New York..... 4
Contractors for Gas-works, Etc.—Murray, Baker & Walker, Fort Wayne, Ind..... 2
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York..... 4
Gas Engineers and Contractors—Hoy, Kennedy & Co., 111 Liberty street, New York..... 4
Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa..... 9
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry street, Philadelphia, Pa..... 8
Gas Superintendent—C. M. Cresson, 417 Walnut st., Phil., Pa.... 9
Gas Apparatus, &c.—Geo. H. Kitchen & Co., 561 Broadway.. . 9
Gas Burners—Wightman Bros., 25 Kilby st., Boston, Mass..... 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. .. 9
Gas Burners—W. Anderson, cor Franklin & Elm sts., N. Y..... 8
Gas Works for Sale—Colonel J. A. Sabbaton, Manhattan Gas Works. N. Y.. 8
Gas Stoves—A. L. Bogart, 792 Broadway 7
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Haskins' Gas Stoves—Ford & Murray, 29 East 13th street..... 8
Plumbers, Gas and Steam Fitters—Moore & Gaussen, 221 West Fifth street, Cincinnati, O..... 6
Patent Gas Exhauster—Smith & Sayre, 484 Broadway 5
Purifying Trays—Jno. L Cheeseman, 147 and 149 Ave. C, N.Y.. 2
Robbins' Patent Joint for Gas and Water Pipes..... 4
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FOUNDRIES.

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Bergen Iron Works—Driving Pipes and Bands—R. A. Brick, 109 Leonard street, N. Y. 7
Columbian Iron Works—Wm. Taylor & Sons, 11, 13 and 15 Adams street, Brooklyn, N. Y... 6
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Continental Works—T. F. Rowland, Greenpoint..... 3
Dealers in Iron, Copper, Brass, etc.—T. Cassidy & Co., corner of Bridge and John streets, Brooklyn, N. Y..... 4
Erie Basin Iron Works—Elizabeth, Dwight and Van Dyke sts., South Brooklyn, N. Y.... .. .. 3, 6
Gaylord's Great Western Pipe Foundry—Office 90 and 92.. 8 Broadway, Cincinnati, Ohio..... ....
Louisville Pipe Works—Dennis Long, Cor. 9th and Water-sts., Louisville, Ky..... 9
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MISCELLANEOUS.

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AUG 8, 1933.